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# What theories do we need to know to conduct ICT4D research?

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## ABSTRACT

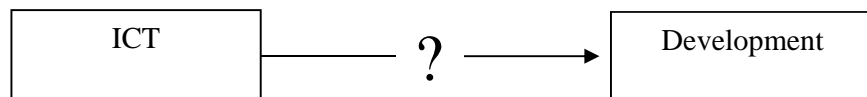
Research in ICT4D is a constant search to answer the question of how ICT fosters development in underdeveloped communities. While many theories have guided research, we are yet to develop a cumulative body of knowledge to answer this question. In this paper, we argue that the elusive link between ICT and development needs to be grounded in three groups of theories: theories to understand development; theories to understand ICT; and theories to understand how ICT make development happen. We present exemplars of theories from each group, and illustrate how we have used them in our research. Through reflecting on which questions to be answered by including the three groups of theories, we propose research agendas.

**Keywords:** ICT4D, Development, Capability Approach, Actor Network Theory, Social Capital, Affordances, Research Agenda

## INTRODUCTION

The role of Information and Communication Technologies (ICT) in fostering development of underdeveloped countries is now widely accepted. The debate is not on whether this happens, but rather on how it happens (De' & Ratan, 2009; Sein & Harindranath, 2004; Walsham, Robey, & Sahay, 2007). This is a challenge with which research in ICT4D has been grappling over the years. As a community, we can be reasonably satisfied that while there are areas for improvement, we are doing relevant research and we have a healthy relationship with practice mainly because our research approach is proactive and interventionist.

The research community has come a long way from simply reporting cases and anecdotes to attempts at gaining a more nuanced understanding of ICT4D based on theories. We now view the field as multi-faceted requiring a more holistic view of development and how ICT can foster development. Researchers in the field have consequently adopted many theories to interpret the findings of their case studies of ICT4D projects around the world. Yet, the plethora of theories has not provided us with a clear picture and a coherent narrative. There is a knowledge gap in the link between ICT intervention and development in the context of developing countries (Avgerou, 2003; Heeks, 2010). We are still trying to understand and explain the development process that specifically emerges from ICT interventions (Thapa & Sæbø, 2014; World Bank, 2003; Zheng, 2009).



**Figure 1. Elusive link between ICT and Development**

We illustrate the search for this elusive link in simple terms in Figure 1. There has been attempts to articulate and elaborate this link (Sein and Harindranath 2004); While they examined development perspectives, their conceptualization of ICT were derived from prior work in the mainstream IS literature, and not premised on theory. Hence, on one hand we have case studies that have employed myriad theories; on the other hand we have integrative frameworks that essentially have not built upon these theories. As a result, we are yet to build cumulative knowledge on ICT4D. The research community needs theories to discover the link between ICT and development which can inform research and be the basis for guiding practice.

In this paper, we propose that a minimum set of three groups of theories are needed to begin the search for the link between ICT and development:

Group 1. Development theories: What is development (D)?

Group 2. Theories conceptualizing ICT: What is ICT?

Group 3. Theories linking ICT to D: How does ICT make D happen?

In the rest of the paper, we elaborate on these groups and present Capability approach as an exemplar of group 1, theory of affordances as exemplar of Group 2 and Social Capital and Actor-Network theory (ANT) as exemplars of Group 3. We justify our suggestion of these

theories and illustrate these through examples of empirical work that we have carried out in our published research. We then discuss our proposal revisiting Sein and Harindranath (2004), and conclude the paper by suggesting agendas for research in ICT4D.

## **THEORIES ON DEVELOPMENT**

### **Review**

The meaning of development has shifted over time. Early development perspectives was characterized by a belief in the “makeability” of societies, a homogeneous view of developing countries and the importance of nation states (Schuurman, 2000). The traditional development paradigm is often associated with the modernization theory, where developing countries are seen as not having the knowledge and resources to advance insufficient modes of production (Prakash & De', 2007). The West is seen as the role model and in order to develop, people and nations need to become more “Western”. The idea was that developing countries can copy developed countries power over technology, methods and progress and leapfrogging various stages in the developmental process (Sein & Harindranth, 2004).

As a response to traditional development theories, various theories appeared that criticized the Western notion of development (Andersson, 2010). Instead of copying the west, the focus was on aspects such as small-scaleness and indigenous practices. The development critique also resulted in theories that blame the West for countries underdevelopment. According to dependency theory, “poverty is not accidental, but is caused by the very processes that made developed countries rich” (Sein & Harindranth, 2004, p.16). Another example is Escobar’s notion of anti-development (Escobar, 1995) that blames the West for underdevelopment, claiming that it is responsible for the poverty experienced by many countries. According to Escobar, developing countries would be better off if the West did not interfere with their progress.

Clearly, there is no consensus on how development should be understood (Sein and Harindranath, 2004). However, in more recent years, there is a belief that if development is to take place, certain factors needs to be considered. Development should enlarge people’s choices (Peet, 1999), nurture a culture of tolerance and peace (Albright, 2005) and expose social and political contradictions, thereby removing the power of oppressors (Freire, 1970). A major contributor to this shift in policy was the introduction of the human development index (HDI). HDI was championed by Mahbub ul Haq, who, together with other development economists developed the index which was launched in 1990. The Nobel laureate Amartya Sen also helped

with the index. Sen is known for his work with the capability approach which has had an impact on both academia and policy making (Robeyns, 2006). According to Sen (1999), development should be seen as the freedom for people to live the lives that they have a reason to value. He argues that poverty should be viewed as capability deprivation and not only as an economic factor. Thus Sen expanded the information base of development to include a broader picture.

## **Summary**

Our brief review of the ICT4D research landscape presented above reveals that despite the quest to link ICT and development, the development perspective is often not explicit in ICT4D research. In a more extensive literature review on theories used in ICT4D Andersson & Hatakka (2013) found that only 31 of 143 papers used a development theory to analyze the data. Thirteen papers used a theory to understand economic growth and eighteen papers used development theories to understand human- and multidimensional development outcomes. A common theme in the economic growth papers is to use economic theories to explain economic growth based on the modernization of existing systems. The two most used theories for human development are the capability approach (Sen, 1999) and the sustainable livelihood framework (DFID, 1999).

## **Illustrative example**

### *Short case description*

The example involves a project in which one of the authors was involved. The capability approach was used to evaluate the use of ICT in rural study circles in Kwale County on the south coast of Kenya (Hatakka et al., 2014). Kwale County has high poverty and low literacy levels as well as high drop-out rates from schools. The infrastructure is poorly developed and access to reliable Internet connections is rare outside the main cities. The study circles were initiated by CORDIO East Africa to promote adult education, use of ICT and to support income generating activities. Through using ICT, the project aimed to enhance the well-being for the study circle participants by 1) support the education with learning content, 2) provide the communities with access to technology, and 3) increase ICT literacy.

### *Rationale for using the capability approach*

The rationale for choosing the capability approach was that the ICT use varied between the study circles, and therefore the impacts could vary greatly between them. Thus, a theory was needed that was broad enough to capture several aspects of human development. The choice was also informed by the approach focus on individuals and the need to evaluate, not only the outcome results, but also whether the condition for the individuals were enabling and just. Finally, the

researchers wanted to move away from a technology deterministic view of development. In the capability approach, ICTs are seen as a mean to an end, rather than an end in itself (Zheng 2009).

### *Analysis*

The study was interpretative and based on group interviews with different actors (study circle groups, government officials, project management, public access providers and support staff). The data was analyzed and categorized based on the main constructs in the capability approach, ICT used (means to achieve), capabilities the ICT had enabled (freedom to achieve), functionings (realized achievement) and conversion factors (factors that affect the development process). The researchers also looked for pattern within each construct, and how the conversion factors affected development for the individuals.

### *Findings*

The study showed that capabilities were enabled on several different levels. The introduction of ICT had an effect on their ability to make an income, e.g., by starting small internet cafes or by promoting their products. The availability of information and learning content had improved their learning capabilities. It had also improved their literacy, their ability to use electronic services and it had increased their self-confidence. Furthermore, the ICT had not only an effect on the individuals in the study circles, the whole communities benefited as they now had access to computers with Internet (Hatakka et al., 2014). Further analysis indicated that, while many of the groups had similar objectives with the ICT use, the outcome differed to a great degree due to different conversion factors (Hatakka et al., 2013). For example, cultural traditions in one community restricted the use of Internet for women, limiting the potential outcomes enabled by communication and access to information. While the capability approach provided a clear overall development perspective, it lacked the detail to explain the process from the introduction of the ICT to an achievement. We need a way to conceptualize the role ICT had for the expansion of individuals' opportunities and choices.

## **THEORIES ON ICT**

### **Review**

While several theories have been used in ICT4D research, few studies have conceptualized what ICT means. The one notable attempt by Sein and Harindranath (2004) based the conceptualization on the much cited paper by Orlikowski and Iacono (2001). However, that paper is descriptive and the result of a review of how IT artifacts have been studied in the

mainstream IS literature. It was not based on theory. Consequently, the conceptualization of ICT by ICT4D researchers often lack theoretical underpinnings. To address this gap, we propose the theory of Affordances as a basis to conceptualize the role of ICT in Development

The theory of affordances goes back to the work of Gibson, who defines affordance as the interaction between an actor (the individual or organization involved) and the environment, including the properties of the actor and of the environment (Gibson 1986). Affordances was introduced into the field of technology to indicate how the materiality of objects favors, shapes, invites, and constrains specific use (Zammuto et al., 2007), and originates from the argument that people pick up information relevant to their needs from objects within their environment, representing the affordances of the object, not the properties (Markus & Silver, 2008). This implies that affordances are specific to one actor; hence, an affordance for one actor may be completely useless for another. The perception and actualization of affordances are dependent on the relationship between system and user in the context in which information systems (IS) are used (Pozzi et al., 2014).

The concept has become popular within the area of IS to explore adoption within organizational arrangements resulting from the combination of work practices and features offered by innovative use of IT (Zammuto et al., 2007). Affordances describe the action possibilities allowed by material properties within IS (Markus & Silver, 2008), proposing a bridging concept to explain the intersection between IT systems and organizational systems. This allows for the examination of how goal-oriented individuals interpret material properties within IS to create changes in organizational practices, to be “associated with achieving organizational-level immediate concrete outcomes in support of organizational level goals” Strong et al. (2014, p.69). Thus, affordances relate not only to the individual level, but also to the potential for action on a collective level within an organization and to the support they provide to reach the organization’s goals (Pozzi et al., 2014).

Affordances involve a network of human, social, and technical objects, which in various combinations enable action at different levels of granularity (Bygstad et al., 2015). Therefore, affordances emerge from social practices involving technology, and are related to the experience, skills, and cultural understanding of the user, which are relational and situated (Zheng & Yu, 2016). Hence, affordances are relevant for examining users with specific needs, goals, and practices (Zheng & Yu, 2016) in a particular historical, cultural, and social context (Fayard & Weeks, 2014). Affordances are suggested to offer a way of moving forward in developing conceptualizations of organizations in an era with high focus on ICT.

## Summary

We argue that bringing Affordances into the ICT4D field would help to better understand the role of ICT. The technological components are often seen as a “black-box” within ICT4D research, without really investigating how the process by which the ICT influences such projects. Technology is hence seen as commodity that more or less automatically would contribute to some form of development. Our argument resonates with, amongst others, Zheng and Stahl (2011) who argue that seeing technology as neutral is too simplistic and call for a more “*sophisticated and critical view of technology*” (p.70).

## Illustrative example

### *Short case description*

The example was using affordances by another of the authors to investigate an eParticipation projects from Bandung, Indonesia (Wahid and Sæbø, 2015). Indonesia is among the top users of social media in the world, with more than 70 million Facebook users, many of them young citizens accessing such services through their mobile phones. In the city of Bandung, social media was introduced to encourage direct participation in political processes, for the municipality to communicate with external stakeholders and to coordinate internal processes, despite the lack of widespread inclusion of ICT in most governmental services.

### *Rationale for using Affordances*

The affordances lens contributed to an increased understanding of the role that technology plays in relation to goal-oriented actors. The aim was to better understand how social media was being used, by whom, the consequences of contextual factors, and the consequences of use and adoption of such services.

### *Analysis*

An interpretive approach was adopted to conduct the case. Interviews with key actors, archival data, reports, social media contributions, and researchers’ notes from on-site visits were analysed based on the affordances perspective. The researchers looked for empirically observable outcomes and events by investigating the data to identify actual events that allowed them to identify the existence of affordances

### *Findings*

Guided by the work of Pozzi et al. (2014), the study identified nine *actualized affordances* (Facilitating direct communication; Inviting citizen participation; Maintaining integrity;



Eliminating power distance; Supporting the internal business process; Reporting activities visually; Assessing officer performance; Facilitating internal coordination; Speeding up processes and Working ubiquitously), six *affordances effects* (Improved citizen participation, Improved transparency, More responsive government, Better public services, Improved institutional capacity and Better working morale), and seven *enabling and/or inhibiting factors* (Political goodwill, Technical skill and knowledge readiness, Focus shifting, Reward systems, Social media use among citizens, Supports from the local parliament and the Transparency culture). The findings indicate that affordance perception plays a role in identifying the action possibilities provided by social media when they interact with the specific contexts of eParticipation. The identification of affordance perception, actualisation, effects, and enabling and inhibiting factors help to make sense of the consequences of introducing ICT for the purpose of eParticipation in a developing country.

## **THEORIES ON HOW ICT CAN LEAD TO DEVELOPMENT**

### **Review**

The capability approach defines development as an enlargement of capabilities. The ‘enabler’ view of ICT (Sein and Harindanath 2004) essentially relates to the enhancement of an individual’s capabilities through empowerment and knowledge. In a similar vein, Oxoby (2009) pointed out that the key to development is to build these capabilities through commodities (e.g. ICT). To do so, one needs to recognize that ICT enables a community to build capabilities. The question is how we actualize this proposed link between development (enlargement of capabilities) enabled by ICT (its affordances). We forward two theories to answer this question.

The need for the first theory, Social Capital, ironically arises from a criticism of the capability approach that it has an individual focus. The approach emphasizes the development of individual capabilities and de-emphasizes the role of collective capabilities. Sen considered the collective or social arrangement as merely instrumental in fostering the development of individual capabilities. However, in remote areas of developing countries, individuals are more dependent on their community for realizing their individual capabilities (Evans, 2002; Ibrahim, 2006). The capability approach can be extended by incorporating a communal perspective. Collective capabilities focus on shared (social) capabilities (Comim & Carey, 2001; Ibrahim, 2006). Proponents of the collective capability have argued that Sen’s capability approach provides an analytical and philosophical foundation for the study of human development, but the individual focus is insufficient; it needs to be raised to the collective level (Evans, 2002;

Ibrahim, 2006). One mechanism that has been studied is collective action (Gilbert 2006, Ibrahim, 2006; Thapa et al., 2012).

Collective action is the process of doing something together (Gilbert, 2006), and is contingent on the social norms of reciprocity and trust (Ostrom, 2000). Increased social interaction can promote the trust, acceptance, and alignment that are necessary for collective action (Ostrom, 2000; Syrjänen & Kuutti, 2004). These contingent characteristics are the inherent elements of social capital (Ostrom & Ahn, 2003).

A social capital perspective that focuses on resources embedded in social networks for the mutual benefit of parties within them (Putnam, 2000) has occasionally been used to explore the effects of ICT intervention in communities (Urquhart et al., 2008). Social capital in the form of bonding (e.g. ties between family and keens), bridging (e.g. between different communities) and linking (e.g. between different power and status groups) can be built through social interaction among individuals and groups within a social unit (Portes, 1998; Putnam, 2000; Woolcock & Narayan, 2000). Social capital has been put forward as an approach that can be used to explore the ICT-enabled development process (Díaz Andrade & Urquhart, 2009; Urquhart, et al., 2008). In this regard, ICT can play an instrumental role in facilitating social interaction. It can also enhance civic engagement within and beyond remote communities, and foster the socioeconomic development of these communities (Díaz Andrade & Urquhart, 2009; Huysman & Wulf, 2004; Thapa et al., 2012). For example, studies conducted in the mountain region of Peru demonstrated that ICT could be instrumental in overcoming remoteness and social exclusion problems through extending social capital (Heeks & Kanashiro, 2009). While social capital explains how various social ties can be mobilized to realize the benefits embedded in social networks, it does not describe how social capital is built in the context of technological change. Furthermore, it does not explain who the central actors are and how they build social networks. Clearly, there is a need for a theory to understand the role of various actors in the process of building social capital. Here we propose our second theory: the actor-network theory (ANT) which is a well-established theoretical lens in the IS field that analyses sociotechnical phenomena (Walsham, 1997). The basic premise of ANT is that both human beings and non-human objects are actors or actants and that social, technical, conceptual, and textual elements fit together in a process of heterogeneous engineering (Callon, 1986). Put simply, Actor-Network is a heterogeneous network of aligned interests, including people, organizations and standards (Walsham, 1997). The dimensions of ANT that are particularly relevant to the ICT4D context, are the four translation moments: *problematization*, *interassement*, *enrollment* and

*mobilization* (Callon, 1986). These describes the process by which focal actor(s) enroll other actors to form a network, and mobilize the members of the network to achieve shared objectives. ANT can enhance our understanding of the interplay between various actors and the social network formation process (Thapa, 2011; Stanforth, 2007; Walsham & Sahay, 1999).

## **Summary**

In describing how ICT leads to enlargement of capabilities, ANT can help explaining who the main actors are and how they enroll other actors in the networks. Complementarily, social capital can provide a lens to understand how the participation among actors happen which in turn leads to collective action (Thapa et al., 2012). More specifically, ANT analyses how the processes, controversies and negotiations leading to the formation of a social capital progresses, likewise social capital take in account the role of social structures that influence the actors' enrollment decisions. Therefore, we propose social capital and ANT as a complementary lenses to understand the enrollment process of participants in ICT4D, which can promote collective action. This in turn leads to the building and development of collective and individual capabilities through the improvement of social opportunities, education, and income-generating activities.

## **Illustrative example**

### *Short case description*

ANT and Social Capital was used as interpreting lens by three of the authors in their study of Nepal Wireless Networking Project (NWNP) (Sæbø et al., (2014). The project was initiated in 1997 by educationist and social activist Mahabir Pun. Despite difficult circumstances, such as lack of government support, funding, technical knowledge, and an unstable political system (There was a civil war between the Nepali government and the Maoists when the project started), the project succeeded in providing internet service with minimal wireless technology, home-made antennas, and relay stations in trees at an altitude of 2,700 meters. NWNP is working with Open Learning Exchange (OLE) Nepal, an NGO based in the US and Kathmandu, as a partner to develop educational contents for the school children. Furthermore, to address the challenges of bringing specialist doctors into the mountain villages, NWNP has initiated telemedicine services in some villages of the Myagdi district. A variety of actors participated in the initiation, implementation and operation of this telemedicine initiative. They include the initiator of the project, Saroj Dhital (chief surgeon of Kathmandu Model hospital and president of Nepal Telemedicine association), doctors from urban hospitals, local health workers and

local societies such as mothers' society ("Amah samoh" In Nepali). Currently, NWNP has extended its network to more than 200 villages.

### *Rationale for using SC and ANT*

This study examined the questions: How does a main actor (Pun) create, maintain, and extend bonding, bridging, and linking social capital. How did Pun enroll other actors from OLE, Kathmandu Model Hospital, INGOs, NGOs and local groups such as 'Aama Samoh' through NWNP? How did he mobilize these actors to promote collective action? An integrated framework of SC and ANT was an appropriate understanding lens to answer these questions.

### *Analysis*

The interpretive case study was carried out in ten villages of Myagdi district. Data was collected over three rounds in a three-year span. Data analysis focused on understanding the process of building social capital through ICT intervention, and its relation to collective action. The roles of various actors in social capital formation process was analyzed. The coding and categorization of the data were guided by ANT. The next phase was to relate social capital and collective action, by grouping codes into categories such as bonding, bridging, linking social capitals, and collective action. Finally, data were analyzed to examine how collective action led to enhanced capabilities. The categorization was done using open and axial coding.

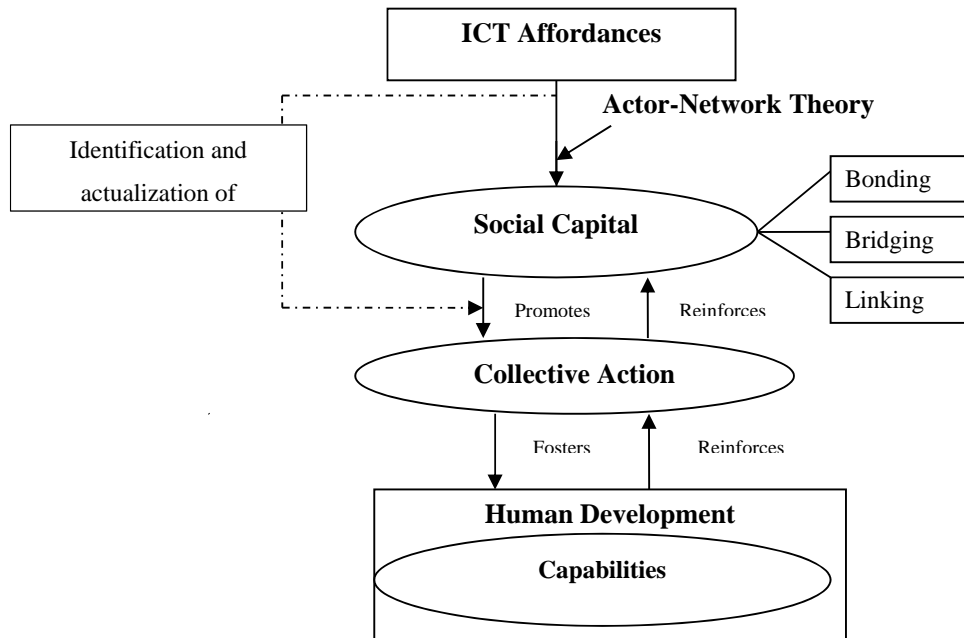
### *Findings*

The analysis showed that one social activist conceived and acted on his idea to form and extend a wireless project, leveraging the bonding, bridging and linking social. To do so, he enrolled and mobilized other relevant actors. The interaction between people in the community and NWNP enabled villagers to extend their social capital, which in turn assisted them in promoting collective action. The collective approach enhanced individual and collective capabilities such as access to telemedicine, e-business, and online teaching and learning services. The analysis also identified several challenges such as an over dependency on a single actor, a high illiteracy rate, poor physical infrastructure, and lack of participation, which may impede the capability building process.

## **DISCUSSION**

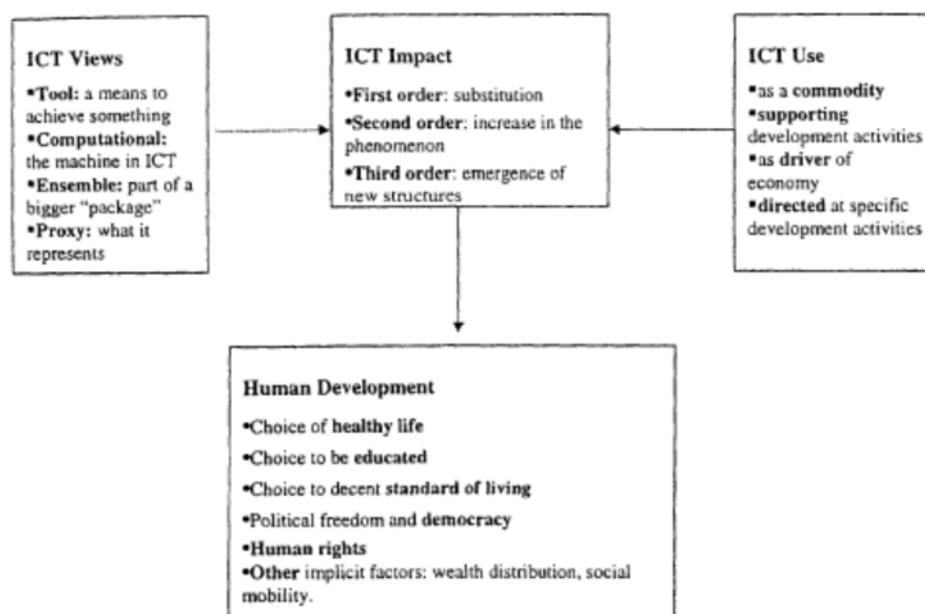
Figure 2 captures the elaboration in the paper. It is based on the framework derived by Thapa (2012). Although presented in linear fashion, it should not be interpreted as linear and deterministic, it should be interpreted holistically. In short, development is conceptualized as

enlargement of freedoms based upon Sen's capability approach. ICT is captured as its affordances; the link is presented as using the affordances to attain human development through collective action, which is achieved through social capital marshaled by focal actors through processes explained by ANT.



**Figure 2. Framework to explore the link between ICT and development**

If we juxtapose Figure 2 on the framework by Sein and Harindranath (2004) (see Figure 3), it becomes apparent that we echo their conceptualization while at the same time enhance it.



**Figure 3. Conceptualization of ICT in development (from Sein and Harindranath, 2004)**

Both frameworks define development in terms of human development. We expand on it by elaborating the capability approach. The theory of Affordance enhances their conceptualization of the ICT artifact, giving a more solid theoretical foundation to link ICT to development. Their framework is silent on the action that is needed and the conditions that enable these actions. We advance Social Capital and ANT as theoretical bases to understand this link.

The question remains about how we measure the impact of ICT interventions. Arguably, the development theory adopted provides these measures. Therefore, enhancement of capabilities is a measure of development and the human development index (HDI) gives tangible measures. Both frameworks adopt this measure. Where Sein and Harindranath add to the link is their conceptualization of impacts in terms of the three order effects (first order being replacement, the second order being increase in the phenomenon enabled by the artifact and the third order being emergence of structures and structural changes). In short, our deliberations complement their framework and thus aim at building a cumulative tradition in ICT4D research.

## **PROPOSED RESEARCH AGENDAS**

ICT4D research has come a long way since the early days of focusing on bridging the digital divide. Historically, the focus has followed the global development agenda (see Heeks (2008) for a chronology of this alignment). The next phase in ICT4D is still to be determined, but we can assume that the new Sustainable Development Goals (UNDP, 2015) will have an impact. The challenge for ICT4D researchers is to keep their focus aligned with the global development agenda. It is time we build on our vast conceptual and empirical base to move forward. In the following, we propose five research agendas.

### **Agenda 1: Theorizing ICT4D**

This agenda captures the crux of the overarching question we raised at the beginning of the paper: the search for the elusive link between ICT to development. We have suggested exemplar theories and empirical studies to illustrate them. We do not have examples of studies that illustrate the use of all the three groups together. An obvious avenue for future research is to examine ICT interventions using all three groups. Our suggestions also allow ICT4D researchers to more precisely state their contribution to the literature (i.e. to which group are they contributing). More research is needed on the specific theoretical streams we have proposed. For example, we need to understand the interplay between various social and technical actors that contributes to the process of building social capital (Lin, 1999). While the instrumental role of ICT as an enabler to promote social capital is illustrated (Huysman & Wulf, 2004), more research is needed to understand the process of building social capital and its implications for development (Urquhart, et al., 2008).

### **Agenda 2: Multiple levels of analysis**

Whose development do we study? We have pointed out that capability approach can be applied at both individual and collective forms. We need to examine how theoretical premises can, and should, be used to inform ICT4D research at different level- and unit of analysis. A good basis for this is the typology developed by Qureshi (2015). The level of analysis can be individual, organization, country, region or world, and based on that different indicators can be used, and the role played by ICT can be analyzed. For example, at the individual level of analysis, the indicators can be capabilities and personal freedom or indices such as human development or gender development. The typology helps us in determining the type of questions we should ask based on the development perspective and level of analysis.

**Agenda 3: Moving from understanding to intervention studies**

The vast majority of ICT4D research has concentrated on understanding the process and impact of initiatives. What is needed now is to use the learning from these studies to guide ICT interventions for development. There are several examples of “doing ICT4D”, the foremost being the HISP program under the auspices of the University of Oslo (<http://www.hisp.org/>). This has proved to be a fertile ground to link to “researching ICT4D”. Leveraging development projects to create knowledge is an opportunity for researchers. We need to conduct more Action Research and Action Design Research studies to create knowledge while solving development problems.

**Agenda 4: The philosophical bases of ICT4D**

We have described the ontological questions ‘What is ICT?’ and ‘What is development?’ as affordances and enlargement of capabilities in previous sections. The question concerning how ICT leads to development has also been explored by applying social capital and ANT. These theoretical lenses provide a plausible description of the phenomena of ICT4D. However, they mainly focus on understanding ‘what’ and ‘how’: the explanation of ‘why’ is missing. Why does the same technology work in certain context and not in another? There is a need for methodological approach that can be applied to identify generative mechanism that may explain ‘why’ the phenomenon happens. ICT4D researchers can gain inspiration from recent studies in IS that are based on the critical realist perspective to identify the mechanism (Bygstad et al., 2016)

**Agenda 5: Expanding ICT4D research to the developed world**

Our last proposed agenda might appear perplexing. Isn’t ICT4D research supposed to examine how ICT can foster development? At first glance, our research should be conducted in developing countries. However, conditions that characterize underdevelopment also exist in pockets of developed countries. The underprivileged who live in these pockets have the same challenges that the poor in the so-called third world countries face. A vivid illustration of this context is the work of Qureshi and her associates in the poorer neighborhoods around Omaha in USA (Qureshi 2015). Their work demonstrates that the theories we discussed here, specifically the capability approach, is equally relevant. We propose that ICT4D research can be carried out in both developed and underdeveloped countries. Development and underdevelopment know no borders.



## CONCLUSION

Our main message in this paper is that ICT4D researchers need to address three groups of theories, not specifically Capability approach, Affordances and Social Capital in conjunction with ANT. While we have illustrated how we have used these theories, we emphasize that these are exemplars only. Other theories maybe equally relevant. Since there are many competing perspectives of development, we must “define which development paradigm we are working with and secondly, to refine our understanding of development processes to recognize their systematic nature” (Kleine, 2010, p.676). Irrespective of our development perspective, and our research agenda, it is necessary to investigate what role ICT can play to foster development. The 4D in ICT4D distinguishes us from mainstream IS research. At the same time, we should recognize that we can inform mainstream IS research.

## REFERENCES

- Albright, P. (2005). Internet Discussion Forum: Open Educational Resources Open Content for Higher Education. Retrieved from Paris: [http://www.unesco.org/iiep/virtualuniversity/media/forum/oer\\_forum\\_final\\_report.pdf](http://www.unesco.org/iiep/virtualuniversity/media/forum/oer_forum_final_report.pdf)
- Andersson, A. (2010). Learning to Learn in e-Learning - Constructive Practices for Development. (Doctoral thesis), Örebro University, Örebro. (Örebro Studies in Informatics 3)
- Andersson, A., & Hatakka, M. (2013). What are we doing? - Theories Used in ICT4D research. Paper presented at the 12th International Conference on Social Implications of Computers in Developing Countries, Ocho Rios, Jamaica.
- Avgerou, C. (2003). The Link Between ICT and Economic Growth in the Discourse of Development. In M. Korpela, R. Montealegre, & A. Poulymenakou (Eds.), *Organizational Information Systems in the Context of Globalization* (pp. 373-386). New York: Springer.
- Bygstad, B., Munkvold, B. E., & Volkoff, O. (2015). Identifying generative mechanisms through affordances: a framework for critical realist data analysis. *Journal of Information Technology*.
- Callon, M. (1986). Some elements of a sociology of translation: domestication of the scallops and fisherman of St. Brieuc Bay. In J. Law (Ed.), *Power, Action and Belief: a new sociology of knowledge?* (pp. 196-233). Routledge, London.
- Comim, F., & Carey, F. (2001). Social capital and the capability approach: are Putnam and Sen incompatible bedfellows? Paper presented at the European Association for Evolutionary Political Economy, Siena, Siena.
- De', R., & Ratan, A. L. (2009). Whose Gain is it Anyway? Structural Perspectives on Deploying ICTs for Development in India's Microfinance Sector. *Information Technology for Development*, 15(4), 259-282.
- DFID. (1999). Sustainable Livelihoods Guidance Sheets. Retrieved from London: <http://www.enonline.net/resources/667>
- Díaz Andrade, A., & Urquhart, C. (2009). The value of extended networks: Social Capital in an ICT intervention in rural Peru. *Information Technology for Development*, 15(2), 108-132.

- Escobar, A. (1995). *Encountering Development: The Making and Unmaking of the Third World*. Princeton: Princeton University Press.
- Evans, P. (2002). Collective capabilities , culture , and Amartya Sen's Development as Freedom. *Studies in Comparative International Development*, 37(2), 54-60.
- Fayard, A. L., & Weeks, J. (2014). Affordances for practice. *Information and Organization*, 24(4), 236-249.
- Freire, P. (1970). *Pedagogy of the oppressed* (M. B. Ramos, Trans.). New York: Continuum.
- Gibson, J. J. (1986). *The Ecological Approach to Visual Perception*. Hillsdale, NJ, NJ: Lawrence Erlbaum Associates.
- Gilbert, M. (2006). Rationality in collective action. *Philosophy of the Social Sciences*, 36(1), 3-17.
- Hatakka, M., Ater, S., Obura, D., & Mibei, B. (2013). Back to Basics - Why (Some) ICT4D Projects Still Struggle Paper presented at the 12th International Conference on Social Implications of Computers in Developing Countries (IFIP wg9.4). , Ocho Rios, Jamaica.
- Hatakka, M., Ater, S., Obura, D., & Mibei, B. (2014). Capability Outcomes from Educational and ICT Capability Inputs – An Analysis of ICT Use in Informal Education in Kenya. *The Electronic Journal for Information Systems in Developing Countries*, 61(1), 1-17.
- Heeks, R. (2008). ICT4D 2.0: The Next Phase of Applying ICT for International Development. *Computer*, 41(6), 26-33.
- Heeks, R. (2010). Do Information and Communication Technologies (ICTs) Contribute to Development? *Journal of International Development*, 22(5), 625-640.
- Heeks, R., & Kanashiro, L. (2009). Telecentres in mountain regions - A Peruvian case study of the impact of information and communication technologies on remoteness and exclusion. *Journal of Mountain Science*, 6(4), 320 - 330.
- Huysman, M., & Wulf, V. (2004). *Social capital and information technology*. Cambridge, MA: MIT Press.
- Orlikowski, W. J. and Iacono, C. S. (2001). Research Commentary: Desperately Seeking the "IT" in IT Research - A Call to Theorizing the IT Artifact. *Information Systems Research*, 12(2), 121-134.
- Ibrahim , S. S. (2006). From individual to collective capabilities : the Capability Approach as a conceptual framework for self - help. *Journal of Human Development*, 7(3), 397-416.
- Kleine, D. (2010). ICT4WHAT? - Using the Choice Framework to Operationalise the Capability Approach to Development. *Journal of International Development*, 22(5), 674-692.
- Latour, B. (2005). *Reassembling the social, an introduction to actor-network theory*: Oxford University Press.
- Lin, N. (1999). Social networks and status attainment. *Annual Review of Sociology*, 25(1), 467-487.
- Markus, L. M., & Silver, M. S. (2008). A Foundation for the Study of IT Effects: A New Look at DeSanctis and Poole's Concepts of Structural Features and Spirit. *Journal of the Association for Information Systems*, 9(10-11), 609-632.
- Ostrom, E. (2000). Collective action and the evolution of social norms. *The Journal of Economic Perspectives*, 14(3), 137-158.
- Ostrom, E., & Ahn, T. K. (2003). *Foundations of Social Capital*. Massachusetts: Edward Elgar Publishing, Inc.
- Oxoby , R. (2009). Understanding social inclusion , social cohesion , and social capital. *International Journal of Social Economics*, 36(12), 1133-1152.
- Peet, R. (1999). *Theories of Development*. New York: The Guilford Press.
- Portes, A. (1998). Social capital : its origins and applications in modern sociology. *Annual Review of Sociology*, 24(1), 1-24.

- Pozzi, G., Pigni, F., & Vitari, C. (2014). Affordance Theory in the IS Discipline: a Review and Synthesis of the Literature. Paper presented at the Twentieth Americas Conference on Information Systems, Savannah, US.
- Prakash, A., & De', R. (2007). Importance of Development Context in ICT4D Projects: A Study of Computerization of Land Records in India. *Information Technology & People*, 20(3), 262-281.
- Putnam, R. (2000). *Bowling Alone - The Collapse and Revival of American Community* New: New York: Simon & Schuster.
- Qureshi, S. (2015). Are we making a Better World with Information and Communication Technology for Development (ICT4D) Research? Findings from the Field and Theory Building. *Information Technology for Development*, 21(4), 511-522.
- Robeyns, I. (2006). The Capability Approach in Practice. *Journal of Political Philosophy*, 14(3), 351-376.
- Schuurman, F. J. (2000). Paradigm Lost, Paradigms Regained? *Development Studies in the Twenty-first Century*. *Third world quarterly*, 21(1), 7-22.
- Sein, M. K., & Harindranth, G. (2004). Conceptualizing the ICT Artifact: Toward Understanding the Role of ICT in National Development. *The Information Society*, 20(1), 15-24.
- Sen, A. (1999). *Development as Freedom*. New York: Anchor Books.
- Stanforth, C. (2007). Using Actor - Network Theory to Analyze E - Government Implementation in Developing Countries. *Information Technologies and International Development*, 3(3), 35-60.
- Strong, D. M., Johnson, S. A., Tulu, B., Trudel, J., Volkoff, O., Pelletier, L. R., . . . Garber, L. (2014). A theory of organization-EHR affordance actualization. *Journal of the Association for Information Systems*, 15(2), 53.
- Syrjänen, A.-L., & Kuutti, K. (2004). Trust, Acceptance, and Alignment: The Role of IT in Redirecting a Community. In M. Huysman & V. Wulf (Eds.), *Social capital and information technology* (pp. 21-50): Cambridge, MA: MIT Press.
- Sæbø, Ø., Sein, M. K., & Thapa, D. (2014). Nepal Wireless Networking Project: Building infrastructure in the mountains from ground up. *Communications of the Association for Information Systems*, 34(1), 11.
- Thapa, D. (2011). The role of ICT actors and networks in development: The case study of a wireless project in Nepal. *The Electronic Journal of Information Systems in Developing Countries*, 49.
- Thapa, D. (2012). Exploring the link between ICT intervention and human development through a social capital lens: The case study of a wireless project in the mountain region of Nepal: Universitet i Agder/University of Agder.
- Thapa, D., Sein, M. K., & Sæbø, Ø. (2012). Building collective capabilities through ICT in a mountain region of Nepal: where social capital leads to collective action. *Information Technology for Development*, 18(1), 5-22.
- Thapa, D., & Sæbø, Ø. (2014). Exploring the link between ICT and development in the context of developing countries: A literature review. *Electronic Journal of Information Systems in Developing Countries*, 64, 15.
- UNDP. (2015). Sustainable Development Goals. Retrieved from [http://www.undp.org/content/dam/undp/library/corporate/brochure/SDGs\\_Booklet\\_Web\\_En.pdf](http://www.undp.org/content/dam/undp/library/corporate/brochure/SDGs_Booklet_Web_En.pdf)
- United Nations. (2008). *The Millenium Development Goals Report*. Retrieved from [http://www.un.org/millenniumgoals/pdf/The\\_Millennium\\_Development\\_Goals\\_Report\\_2008.pdf](http://www.un.org/millenniumgoals/pdf/The_Millennium_Development_Goals_Report_2008.pdf)

- Urquhart , C., Liyanage , S., & Kah , M. M. O. (2008). ICTs and poverty reduction : a social capital and knowledge perspective. *Journal of Information Technology*, 23(3), 203-213.
- Wahid, F., & Sæbø, Ø. (2015). Affordances and Effects of Promoting eParticipation Through Social Media. Paper presented at the International Conference on Electronic Participation.
- Walsham, G. (1997). Actor-network theory and IS research: current status and future prospects. In A. S. Lee, J. Liebenau, & J. I. DeGross (Eds.), *Information systems and qualitative research* (pp. 466-480). London: Chapman & Hall.
- Walsham, G., Robey, D., & Sahay, S. (2007). Foreword: Special Issue on Information Systems in Developing Countries. *MIS Quarterly*, 31(2), 317-327.
- Walsham, G., & Sahay, S. (1999). GIS for District-Level Administration in India: Problems and Opportunities. *MIS Quarterly*, 23(1), 39-65.
- Walsham, G., & Sahay, S. (2006). Research on Information Systems in Developing Countries: Current Landscape and Future Prospects. *Information Technology for Development*, 12(1), 7-24.
- Woolcock, M., & Narayan, D. (2000). Social Capital: Implications for Development Theory, Research, and Policy. *World Bank Res Obs*, 15(2), 225-249. doi:10.1093/wbro/15.2.225
- WorldBank. (2003). Contributing to the Millennium Development Goals: Lessons Learned from Seventeen infoDev Projects Information. *ICT for Development*. Retrieved from
- WSIS. (2014). *WSIS + 10 - Outcome Documents*. Retrieved from Geneva: <http://www.itu.int/net/wsis/implementation/2014/forum/inc/doc/outcome/362828V2E.pdf>
- Zammuto, R. F., Griffith, T. L., Majchrzak, A., Dougherty, D. J., & Faraj, S. (2007). Information technology and the changing fabric of organization. *Organization Science*, 18(5), 749-762.
- Zheng, Y. (2009). Different Spaces for e-Development: What Can We Learn from the Capability Approach? *Information Technology for Development*, 15(2), 66-82.
- Zheng, Y., & Stahl, B. C. (2011). Technology, Capabilities and Critical Perspectives: What can Critical Theory Contribute to Sen's Capability Approach? *Ethics and Information Technology*, 13(2), 69-80.
- Zheng, Y., & Yu, A. (2016). Affordances of social media in collective action: the case of Free Lunch for Children in China. *Information Systems Journal*.